

AMENDMENTS TO THE DRAWINGS

The attached sheet(s) of drawings include changes to Fig(s). 5B, 9A-C and 10 and replace the original sheet(s) including such figures.

Attachment(s): Replacement Sheet including amended Fig. 5B;

Annotated Sheet showing changes to Fig. 5B.

Replacement Sheet including amended Figs. 9A and 9B;

Annotated Sheet showing changes to Figs. 9A and 9B.

Replacement Sheet including amended Figs. 9C and 10; and

Annotated Sheet showing changes to Fig. 9C and 10.

REMARKS

This paper is responsive to a Non-Final Office action dated April 7, 2006. Claims 1-63 were examined. The drawings and specification are objected to by the Office action. Claim 40 stands rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the enablement requirement. Claims 37, 38, 40, and 62 stand rejected under 35 U.S.C. § 112, second paragraph, for being indefinite. Claims 1-3, 6-8, 13-16, 18, 21, 26, 29-31, 36-39, 41-44, 47, 52, 56-57, 59, and 61-63 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,037,649 to Liou et al. Claims 1, 4, 5, 18, 20, 29, 32-34, 41, 45, 46, 52, 53, and 60 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,501,169 to Aoki et al. Claims 9-12 and 48-51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Liou and further in view of Aoki. Claims 19-20 and 54-55 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Aoki. Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Liou in view of U.S. Patent No. 5,456,368 to Onishi et al.

Objections to the Drawings

The drawings are objected to as failing to comply with 37 C.F.R. 1.84(p)(5) because they include the following reference characters not mentioned in the description: 1000, 1002, 1004, 1006, 1008, 1010, 1016, and 1066. Figures 9A, 9B, 9C and 10 are amended consistent with the specification.

Figure 5B is amended to change the reference numeral of top plate 552 to top plate 553.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter for not disclosing “an amplifier circuit coupled in parallel with the inductor structure,” as required by claim 28. Applicant respectfully points the Examiner to FIG. 1 and the associated portions of the specification directed to gain stage 108 included in circuit 100. In addition, Applicant respectfully points the Examiner to paragraph 1075 which states:

[i]n some embodiments of the present invention, the capacitor structures of the LC tank circuit and gain stages included in the oscillator circuitry may be fabricated within traditional integrated circuit layers. In some embodiments, the

capacitor structures of the LC tank circuit and/or gain stages included in the oscillator circuitry may also be included within the Faraday cage, formed under the inductor in the typical integrated circuit layers. If such circuit structures are formed under the inductor in the typical integrated circuit layers, the lowest metal layer (e.g., a metal layer designated metal-1 in an exemplary process) forms the bottom plate of the Faraday cage. The Faraday cage at least partially shields the circuit elements formed underneath the inductor. The plates of the Faraday cage may allow electrical contact to these circuit elements by including openings for electrical leads. In addition, openings in the Faraday cage may exist to accommodate structures formed in the typical integrated circuit layers, e.g., an amplifier stage that is formed beneath the inductor and coupled to the inductor.

At least those portions of the specification provide support for claim 28.

The specification is amended to be consistent with the drawings. The specification is amended to change the reference numeral of top plate 552 of FIG. 5B to top plate 553.

Claim Rejections Under 35 U.S.C. § 112, first paragraph

Claim 40 stands rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the enablement requirement. Applicant respectfully maintains that the Office action fails to establish a *prima facie* case of lack of enablement. See MPEP § 2164.04. Applicant respectfully points out that in a written enablement rejection,

[t]he language should focus on those factors, reasons, and evidence that lead the examiner to conclude that the specification fails to teach how to make and use the claimed invention without undue experimentation, or that the scope of any enablement provided to one skilled in the art is not commensurate with the scope of protection sought by the claims. This can be done by making specific findings of fact. For example, doubt may arise about enablement because information is missing about one or more essential parts or relationships between parts which one skilled in the art could not develop without undue experimentation. In such a case, the examiner should specifically identify what information is missing and why one skilled in the art could not supply the information without undue experimentation. See MPEP § 2164.06(a). References should be supplied if possible to support a *prima facie* case of lack of enablement, but are not always required. *In re Marzocchi* 439 F.2d 220, 224, 169 USPQ 367, 370 (CCPA 1971). However, specific technical reasons are always required.

MPEP § 2164.04 (emphasis added). Applicant respectfully points the Examiner to at least paragraph 1076 of the specification which states:

[w]hile circuits and physical structures are generally presumed, it is well recognized that in modern semiconductor design and fabrication, physical structures and circuits may be embodied in computer readable descriptive form suitable for use in subsequent design, test or fabrication stages. Accordingly, claims directed to traditional circuits or structures may, consistent with particular language thereof, read upon computer readable encodings and representations of same, whether embodied in media or combined with suitable reader facilities to allow fabrication, test, or design refinement of the corresponding circuits and/or structures. Structures and functionality presented as discrete components in the exemplary configurations may be implemented as a combined structure or component. The invention is contemplated to include circuits, systems of circuits, related methods, and computer-readable medium encodings of such circuits, systems, and methods, all as described herein, and as defined in the appended claims. As used herein, a computer readable medium includes at least disk, tape, or other magnetic, optical, semiconductor (e.g., flash memory cards, ROM), or electronic medium and a network, wireline, wireless or other communications medium.

Applicant respectfully maintains that the specification satisfies the requirements of 35 U.S.C. § 112, first paragraph. Accordingly, Applicant respectfully requests that the rejection of claim 40 under 35 U.S.C. § 112, first paragraph be withdrawn.

Claim Rejections Under 35 U.S.C. § 112, second paragraph

Claim 37, 38, 40, and 61 stands rejected under 35 U.S.C. § 112, second paragraph, for being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Claim 40 is amended to clarify claim language. Claims 37, 38, and 61 are amended to provide antecedent basis. Applicant respectfully maintains that amended claims 37, 38, 40, and 61 satisfy the requirements of 35 U.S.C. § 112, second paragraph. Accordingly, Applicant respectfully requests that the rejection of claims 37, 38, 40 and 61 under 35 U.S.C. § 112, second paragraph be withdrawn.

Claim Rejections Under 35 U.S.C. § 102

Claims 1-3, 6-8, 13-16, 18, 21, 26, 29-31, 36-39, 41-44, 47, 52, 56-57, 59, and 61-63 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,037,649 to Liou et al., (hereinafter, “Liou”). Claims 1, 4-5, 18, 20, 29, 32-34, 41, 45-46, 52-53, and 60 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,501,169 to Aoki et al, (hereinafter, “Aoki”).

Claim 1 is amended to incorporate limitations of claim 6. Claim 6 is canceled.

Regarding amended claim 1, Applicant respectfully maintains that Liou, alone or in combination with other references of record, fails to teach or suggest

an electromagnetic shielding structure formed at least partially in one or more redistribution layers formed on an integrated circuit die, the electromagnetic shielding structure substantially surrounding a circuit element,

as required by claim 1. Liou teaches “[a] three-dimensional inductor formed in a conventional integrated circuit technology.” Abstract (emphasis added). A metal shielding ring of Liou is formed in the same levels as the metal lines forming the inductor, i.e., the metal shielding ring is formed in conventional integrated circuit technology. Col. 4, line 46- col. 5, line 4. Under 35 U.S.C. § 102, each element of a claim must be found in the single prior art reference, either expressly or inherently. See Minnesota Min. & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 1565, 24 U.S.P.Q.2d (BNA) 1321, 1326 (Fed. Cir. 1992). If the reference fails to teach even one limitation of a claim, then the claim is not anticipated. See Kloster Speedsteel AB v. Crucible Inc., 848 F.2d 1560, 7 U.S.P.Q.2d (BNA) 1507 (Fed. Cir. 1986). Nowhere does Liou teach or suggest one or more redistribution layers, as required by amended claim 1. Although Liou fails to teach or suggest one or more redistribution layers, the Office action improperly included a redistribution layer in FIG. 3B presented in the Office action. Applicant respectfully maintains that Liou fails to teach or suggest the redistribution layer illustrated in FIG. 3B presented in the Office action. Accordingly, the rejection of claim 1 under 35 U.S.C. § 102 as being anticipated by Liou should be withdrawn.

In addition, Applicant respectfully maintains that Liou, alone or in combination with other references of record, fails to teach or suggest that

the electromagnetic shielding structure has a top plate, a bottom plate, and sidewalls,

as required by amended claim 1. Liou teaches “three levels of metal shielding rings (S1, S2, and S3)” interconnected by vias. Col. 4, line 57-col. 5, line 4 (emphasis added). The three levels of metal shielding rings of Liou teaches a shielding structure without a top plate or a bottom plate (FIG. 3A-C) and fails to teach or suggest an electromagnetic shielding structure having a top plate, a bottom plate, and sidewalls, as required by amended claim 1.

Further, Applicant respectfully maintains that Aoki, alone or in combination with other references of record, fails to teach or suggest that

the electromagnetic shielding structure has a top plate, a bottom plate, and sidewalls,

as required by amended claim 1. Aoki teaches a circuit element forming area 12 including an induction element covered with conductive layer 19. Col. 11, lines 47-57. Nowhere does Aoki teach or suggest an electromagnetic shielding structure having a top plate, a bottom plate, and sidewalls, as required by amended claim 1.

For at least these reasons, Applicant respectfully maintains that claim 1 distinguishes over Liou, Aoki, and all references of record. Accordingly, Applicant respectfully requests that the rejection of claim 1 and all claims dependent thereon, be withdrawn.

Claim 29 is amended to require that

the electrically conductive enclosure includes a top plate, a bottom plate, and sidewalls.

Regarding amended claim 29, Applicant respectfully maintains that Liou, alone or in combination with other references of record, fails to teach or suggest

electromagnetically shielding at least one circuit element formed on an integrated circuit die by substantially surrounding the circuit element with an electrically conductive enclosure formed at least partially in one or more redistribution layers formed on the integrated circuit die,

as required by claim 29. Liou teaches “[a] three-dimensional inductor formed in a conventional integrated circuit technology.” Abstract (emphasis added). A metal shielding ring of Liou is formed in the same levels as the metal lines forming the inductor, i.e., the metal shielding ring is formed in conventional integrated circuit technology. Col. 4, line 46- col. 5, line 4. Nowhere does Liou teach or suggest one or more redistribution layers, as required by amended claim 29. Although Liou fails to teach or suggest one or more redistribution layers, the Office action improperly included a redistribution layer in FIG. 3B presented in the Office action. Applicant respectfully maintains that Liou fails to teach or suggest the redistribution layer illustrated in FIG. 3B presented in the Office action. Accordingly, the rejection of claim 29 under 35 U.S.C. § 102 as being anticipated by Liou should be withdrawn.

In addition, Applicant respectfully maintains that Liou, alone or in combination with other references of record, fails to teach or suggest that

the electrically conductive enclosure includes a top plate, a bottom plate, and sidewalls,

as required by amended claim 29. Liou teaches “three levels of metal shielding rings (S1, S2, and S3)” interconnected by vias. Col. 4, line 57-col. 5, line 4 (emphasis added). The three levels of metal shielding rings of Liou teaches a shielding structure without a top plate or a bottom plate (FIG. 3A-C) and fails to teach or suggest an electrically conductive enclosure including a top plate, a bottom plate, and sidewalls, as required by amended claim 29.

Further, Applicant respectfully maintains that Aoki, alone or in combination with other references of record, fails to teach or suggest that

the electrically conductive enclosure includes a top plate, a bottom plate, and sidewalls,

as required by amended claim 29. Aoki teaches a circuit element forming area 12 including an induction element covered with conductive layer 19. Col. 11, lines 47-57. Nowhere does Aoki teach or suggest an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls, as required by amended claim 29.

For at least these reasons, Applicant respectfully maintains that claim 29 distinguishes over Liou, Aoki, and all references of record. Accordingly, Applicant respectfully requests that the rejection of claim 29 and all claims dependent thereon, be withdrawn.

Claim 41 is amended to include limitations of claim 47. Claim 47 is canceled.

Regarding amended claim 41, Applicant respectfully maintains that Liou, alone or in combination with other references of record, fails to teach or suggest

forming an electromagnetic shielding structure at least partially in one or more redistribution layers formed on an integrated circuit die, the electromagnetic shielding structure substantially surrounding a circuit element,

as required by claim 41. Liou teaches “[a] three-dimensional inductor formed in a conventional integrated circuit technology.” Abstract (emphasis added). A metal shielding ring of Liou is formed in the same levels as the metal lines forming the inductor, i.e., the metal shielding ring is formed in conventional integrated circuit technology. Col. 4, line 46- col. 5, line 4. Nowhere does Liou teach or suggest one or more redistribution layers, as required by claim 41. Although Liou fails to teach or suggest one or more redistribution layers, the Office action improperly included a redistribution layer in FIG. 3B presented in the Office action. Applicant respectfully maintains that Liou fails to teach or suggest the redistribution layer illustrated in FIG. 3B presented in the Office action. Accordingly, the rejection of claim 41 under 35 U.S.C. § 102 as being anticipated by Liou should be withdrawn.

In addition, Applicant respectfully maintains that Liou, alone or in combination with other references of record, fails to teach or suggest that

the electromagnetic shielding structure comprises an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls,

as required by amended claim 41. Liou teaches “three levels of metal shielding rings (S1, S2, and S3)” interconnected by vias. Col. 4, line 57-col. 5, line 4 (emphasis added). The three levels of metal shielding rings of Liou teaches a shielding structure without a top plate or a bottom plate (FIG. 3A-C) and fails to teach or suggest an electromagnetic shielding structure comprising an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls, as required by amended claim 41.

Further, Applicant respectfully maintains that Aoki, alone or in combination with other references of record, fails to teach or suggest that

the electromagnetic shielding structure comprises an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls,

as required by amended claim 41. Aoki teaches a circuit element forming area 12 including an induction element covered with conductive layer 19. Col. 11, lines 47-57. Nowhere does Aoki teach or suggest an electromagnetic shielding structure comprising an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls, as required by amended claim 41.

For at least these reasons, Applicant respectfully maintains that claim 41 distinguishes over Liou, Aoki, and all references of record. Accordingly, Applicant respectfully requests that the rejection of claim 41 and all claims dependent thereon, be withdrawn.

Claim 61 is amended to require that

the means for electromagnetic shielding comprises an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls.

Regarding amended claim 61, Applicant respectfully maintains that Liou, alone or in combination with other references of record, fails to teach or suggest that

the means for the electromagnetic shielding comprises an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls,

as required by amended claim 61. Liou teaches “three levels of metal shielding rings (S1, S2, and S3)” interconnected by vias. Col. 4, line 57-col. 5, line 4 (emphasis added). The three levels of metal shielding rings of Liou teaches a shielding structure without a top plate or a bottom plate (FIG. 3A-C) and fails to teach or suggest an electromagnetic shielding structure comprising an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls, as required by amended claim 61.

In addition, Applicant respectfully maintains that Liou fails to teach or suggest

means for routing as part of the integrated circuit die an electrical connection between a contact pad on an integrated circuit die and a location of a package contact,

as required by claim 61. Liou teaches “[a] three-dimensional inductor formed in a conventional integrated circuit technology.” Abstract (emphasis added). A metal shielding ring of Liou is formed in the same levels as the metal lines forming the inductor, i.e., the metal shielding ring is formed in conventional integrated circuit technology. Col. 4, line 46- col. 5, line 4. Nowhere does Liou teach or suggest means for routing as part of the integrated circuit die an electrical connection between a contact pad on an integrated circuit die and a location of a package contact, as required by claim 61.

For at least these reasons, Applicant respectfully maintains that amended claim 61 distinguishes over Liou and all references of record. Accordingly, Applicant respectfully requests that the rejection of claim 61 and all claims dependent thereon, be withdrawn.

Claim 63 is amended to require that

the means for shielding comprises an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls.

Regarding amended claim 63, Applicant respectfully maintains that Liou, alone or in combination with other references of record, fails to teach or suggest that

the means for shielding comprises an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls,

as required by amended claim 63. Liou teaches “three levels of metal shielding rings (S1, S2, and S3)” interconnected by vias. Col. 4, line 57-col. 5, line 4 (emphasis added). The three levels of metal shielding rings of Liou teaches a shielding structure without a top plate or a bottom plate (FIG. 3A-C) and fails to teach or suggest a means for shielding comprising an electrically conductive enclosure having a top plate, a bottom plate, and sidewalls, as required by amended claim 63. For at least this reason, Applicant respectfully maintains that amended claim 63 distinguishes over Liou and all references of record. Accordingly, Applicant respectfully requests that the rejection of claim 63 and all claims dependent thereon, be withdrawn.

Claim Rejections – 35 U.S.C. §103

Claims 9-12 and 48-51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Liou and further in view of Aoki. Applicant respectfully maintains that claims 9-12 and 48-51 depend from allowable base claims and are allowable for at least this reason.

Claims 19-20 and 54-55 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Aoki. Applicant respectfully maintains that claims 19-20 and 54-55 depend from allowable base claims and are allowable for at least this reason.

Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Liou in view of U.S. Patent No. 5,456,368 to Onishi et al. (hereinafter “Onishi”). Applicant respectfully maintains that claim 27 depends from an allowable base claims and is allowable for at least this reason.

Allowable Subject Matter

Claims 7-11, 13, and 15 are amended to depend from claim 1.

Claims 34 and 35 are amended to clarify claim language.

Claims 48-50 and 56 are amended to depend from claim 41.

Applicant appreciates the indication of allowable subject matter in claims 17, 22-25, 28, 35, and 58. Applicant believes that 17, 22-25, 28, 35, and 58 depend from allowable base claims and are allowable for at least this reason.

Additional Remarks

Claim 40 is amended to require that

the electromagnetic shielding structure has a top plate, a bottom plate, and sidewalls.

Applicant believes that amended claim 40 is allowable over the art of record.

In summary, all claims are believed to be allowable over the art of record, and a Notice of Allowance to that effect is respectfully solicited. Nonetheless, if any issues remain that could be more efficiently handled by telephone, the Examiner is requested to call the undersigned at the number listed below.

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that, on the date shown below, this correspondence is being

- ☐ deposited with the US Postal Service with sufficient postage as first class mail and addressed as shown above.
☐ facsimile transmitted to the US Patent and Trademark Office.

Date

EXPRESS MAIL LABEL: EV 735339442 US

Respectfully submitted,



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ANNOTATED SHEET

Title: Redistribution Layer Shielding of a Circuit Element

Inventors: Ligang Zhang et al.

Docket No.: 026-0041

App. No. 10/814,816

8/16

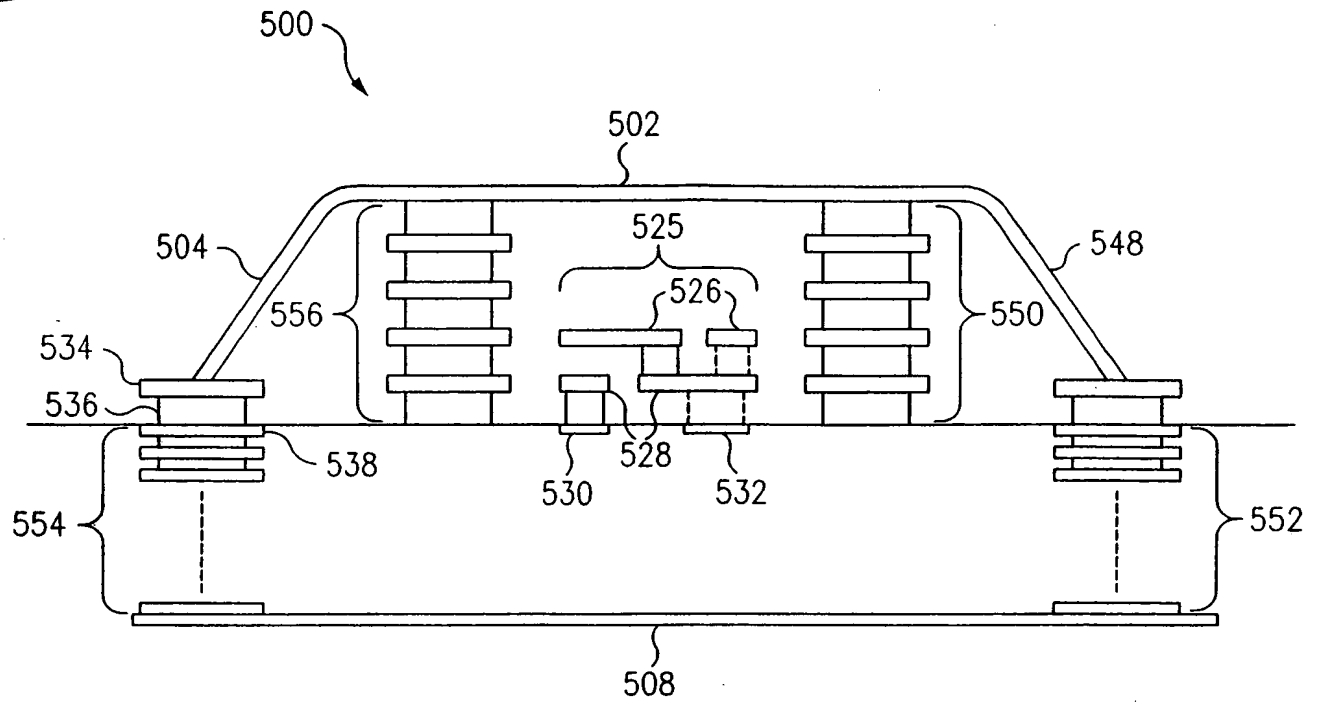


FIG. 5A

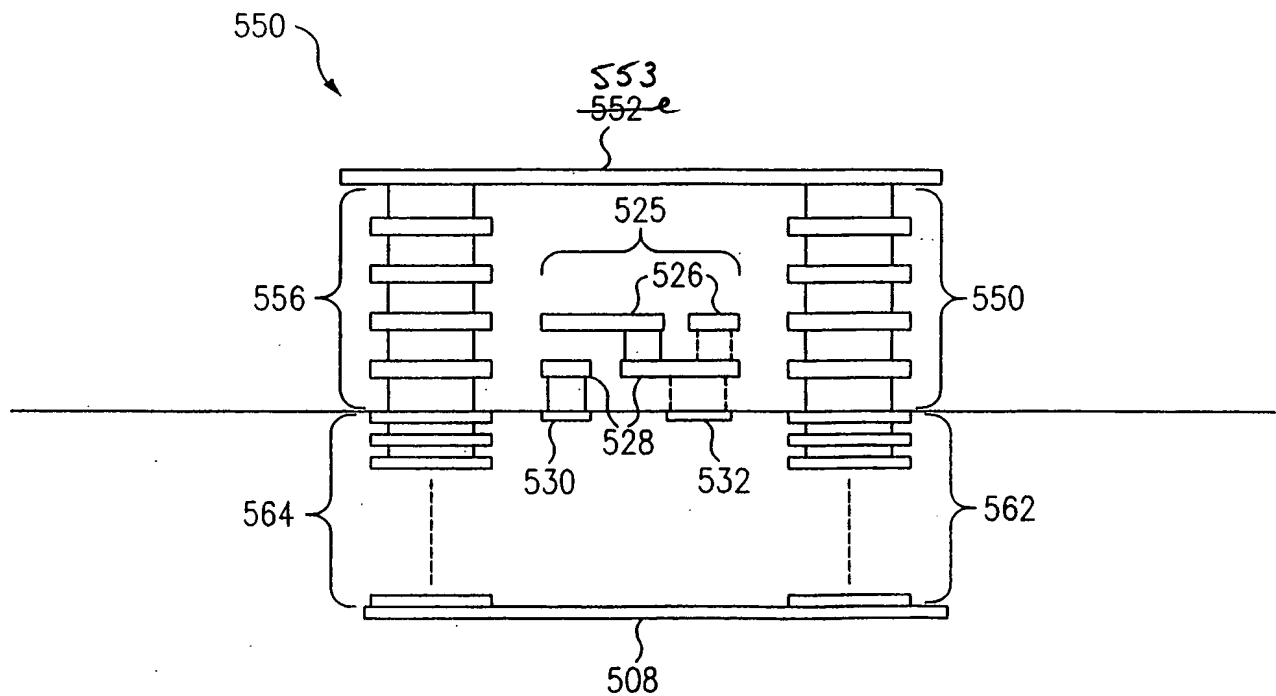


FIG. 5B

ANNOTATED SHEET

Title: Redistribution Layer Shielding of a Circuit Element

Inventors: Ligang Zhang et al.

Docket No.: 026-0041

App. No.: 10/814,816

14/16

900

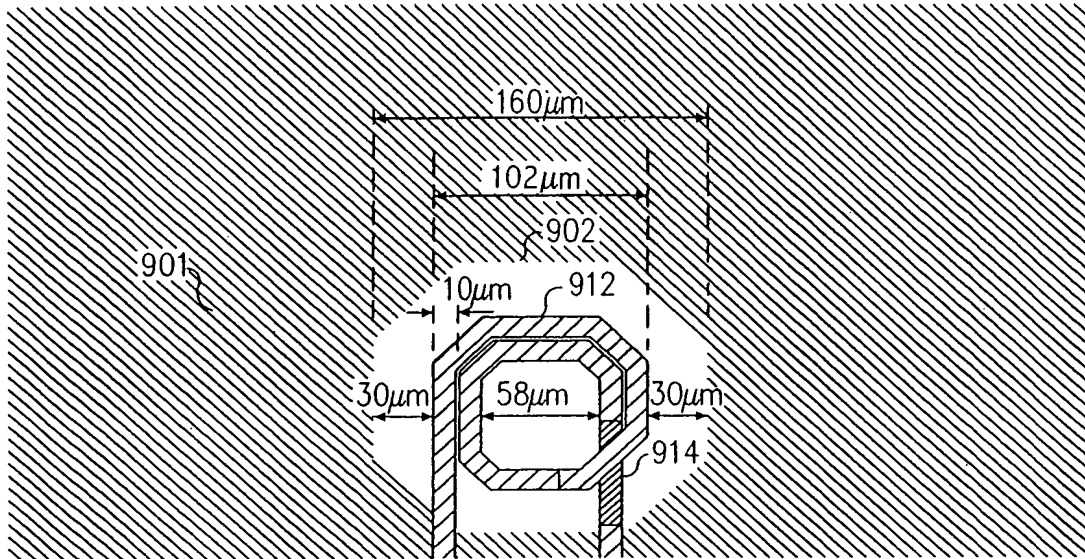


FIG. 9A

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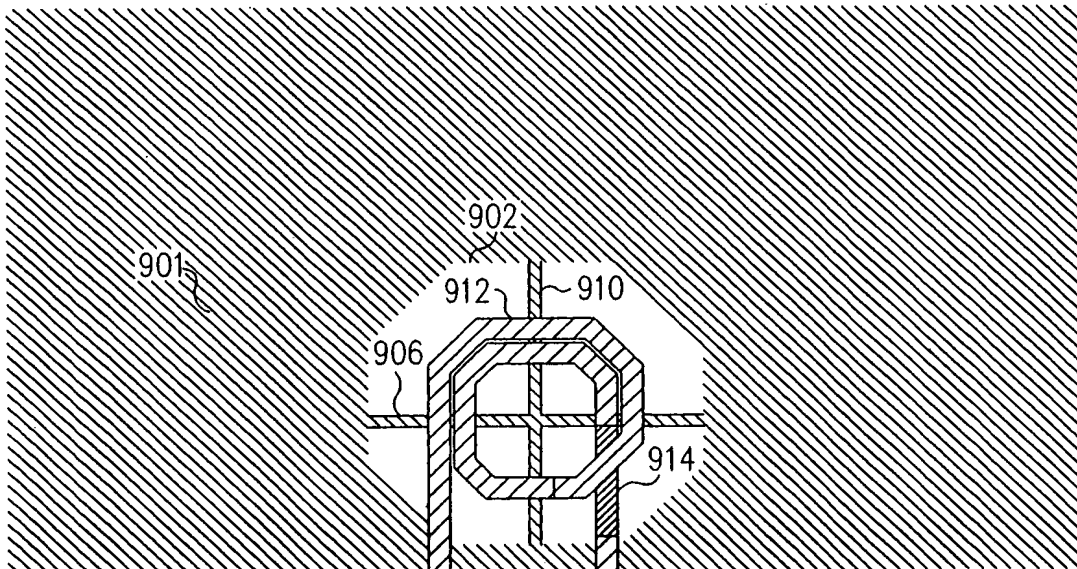


FIG. 9B

ANNOTATED SHEET

Title: Redistribution Layer Shielding of a Circuit Element

Inventors: Ligang Zhang et al.

Docket No.: 026-0041

App. No.: 10/814,816

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900

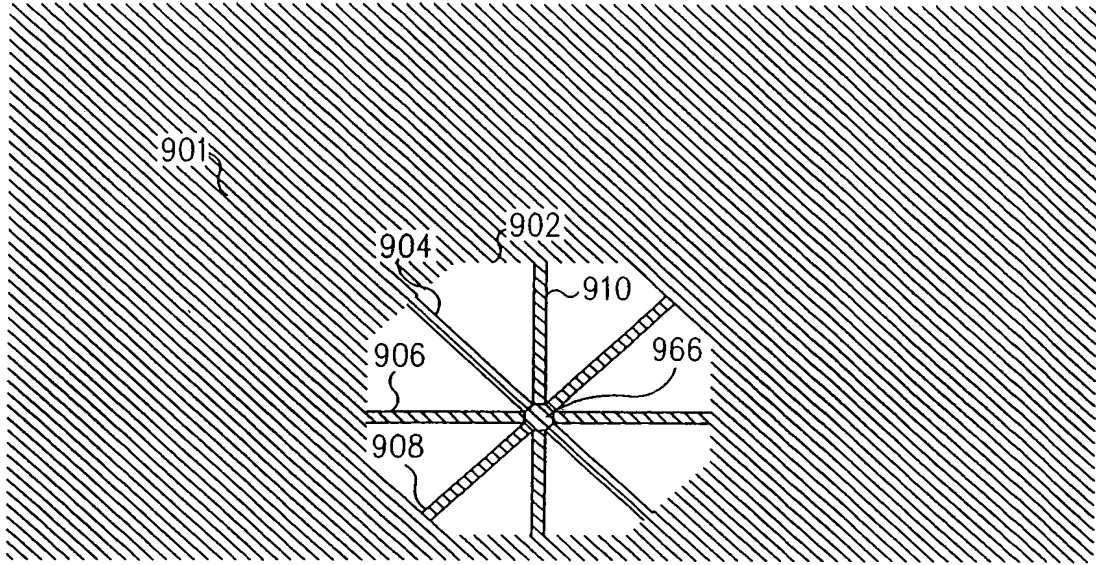


FIG. 9C

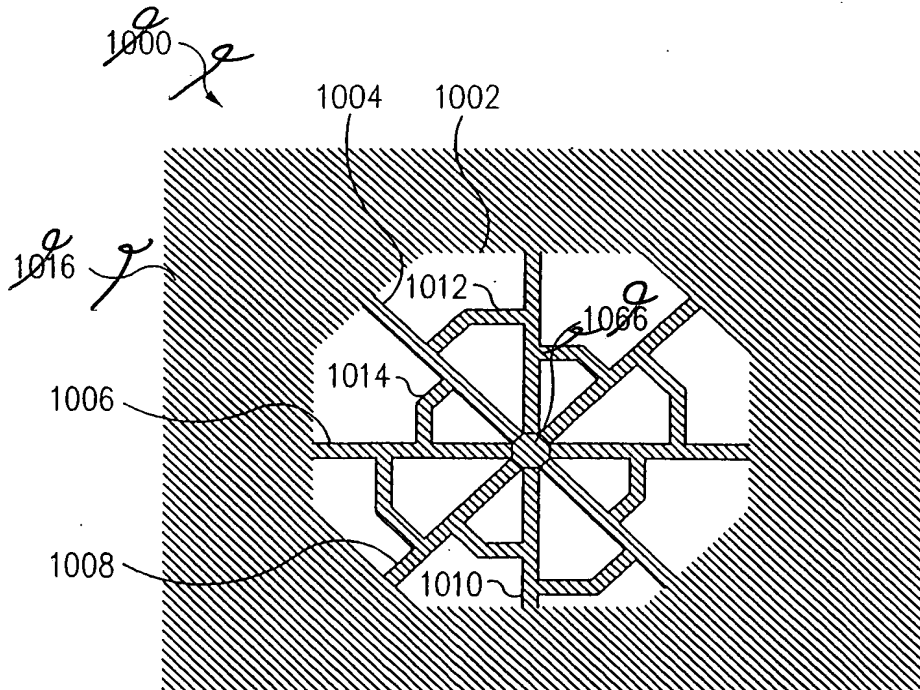


FIG. 10